

REMARKS

This paper is responsive to a Non-Final Office action dated March 9, 2006. Claims 1-57 were examined. Claims 1, 26, and 55 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,949,225 to Sawtell. Claims 2, 10-12, 19-20 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawtell in combination with U.S. Patent No. 5,568,045 to Koazechi.

*Claim Rejections – 35 U.S.C. §102*

Claims 1, 26, and 55 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,949,225 to Sawtell (hereafter, “Sawtell”).

Claim 1 is amended to incorporate limitations of claim 2.

Claim 26 is amended to incorporate limitations of claim 27.

Claim 55 is amended to clarify the invention. Applicants respectfully maintain that Sawtell, alone or in combination with other references of record, fails to teach or suggest

the means for developing the current proportional to absolute temperature includes a resistor coupled to a base of the first bipolar transistor, a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities being formed across the resistor,

as recited in amended claim 55. Accordingly, Applicants respectfully request that the rejection of claim 55 and all claims dependent thereon, be withdrawn.

*Claim Rejections Under 35 U.S.C. § 103*

Claims 2, 10-12, 19-20 and 27 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawtell in combination with U.S. Patent No. 5,568,045 to Koazechi (hereafter, “Koazechi”). Claim 1 is amended to incorporate limitations of claim 2. Claim 2 is canceled.

Regarding amended claim 1, Applicants respectfully maintain that Sawtell, alone or in combination with Koazechi fails to teach or suggest

that the base current is proportional to a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities, the voltage difference being formed across the resistor,

as required by amended claim 1. Sawtell teaches differential input voltage generation circuit 465 applying a voltage  $\Delta V$ , the voltage differential between the collectors of transistors 422 and 423 across base terminals of transistors 425 and 426. Col. 9, lines 14-35. Nowhere does Sawtell teach or suggest a base current proportional to a voltage difference between two base-emitter voltages of transistors configured to have different current densities, or that the voltage difference is formed across a resistor coupled to the base of the first bipolar transistor. Koazechi fails to compensate for the shortcomings of Sawtell. Koazechi teaches the voltage difference DVBE between base-emitter voltages VBE20 and VBE24, which appears across resistor 2. Col. 4, lines 14-21. However, resistor 2 of Koazechi is coupled to the emitter of transistor 24. Nowhere does Koazechi teach or suggest forming a voltage difference between two base-emitter voltages of transistors configured to have different current densities, the voltage difference being formed across a resistor coupled to the base of a bipolar transistor, as required by amended claim 1. For at least this reason, Applicants respectfully maintain that amended claim 1 distinguishes over Sawtell and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 1 and all claims dependent thereon, be withdrawn.

Claims 3-9, 13-15, 21-25, 28-37 and 56-57 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Sawtell in combination with Koazechi. Regarding claim 3, Applicants respectfully maintain that the Office fails to make a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of the ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations.

See MPEP § 2143. Applicants respectfully maintain that the Office fails to provide a reference that teaches or suggests,

a reference voltage produced by the voltage reference generator is proportional to a parabolic function of temperature,

as required by claim 3. Sawtell teaches differential input voltage generation circuit 465 that generates a current  $I_4$  that is temperature independent. Col. 10, lines 47-64. Koazechi teaches a stable reference voltage with respect to changes in temperature. Col. 1, lines 9-17. Nowhere do the references of record teach or suggest a voltage reference generator generating a reference voltage that is proportional to a parabolic function of temperature, as required by claim 3. For at least this reason, Applicants respectfully maintain that amended claim 3 distinguishes over Sawtell and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 3 be withdrawn.

Regarding claim 4, Applicants respectfully maintain that Sawtell, alone or in combination with Koazechi fails to teach or suggest that

the first bipolar transistor is a low-beta transistor,

as required by claim 4. Applicants respectfully point the Examiner to paragraphs 1022 of the specification which states:

[n]ote that in a typical CMOS process, parasitic substrate pnp transistors (e.g., in the case of an n-well process) and parasitic substrate npn transistors (e.g., in the case of a p-well process) may be used as bipolar transistors. These transistors have a low-beta (e.g.,  $\beta < 10$ ) as compared to transistors formed in a bipolar process (e.g.,  $\beta > 100$ ). Thus currents produced by amplifying a base current of the CMOS bipolar transistor are manageable by typical CMOS devices.

Koazechi teaches a reference voltage generator in a CMOS transistor circuit. Col. 1, lines 6-8. Assuming *arguendo* that the CMOS bipolar transistors of Koazechi teach low-beta bipolar transistors, Applicants respectfully maintain that neither Sawtell nor Koazechi teach or suggest modifying the teachings of Sawtell to include such low-beta bipolar transistors. Applicants

respectfully maintain that neither Koazechi nor Sawtell, alone or in combination with other references of record, teach or suggest that low-beta bipolar transistors are recognized as being suitable for bipolar differential input voltage generation circuit 465 of Sawtell, as implied by the Office in reliance on In re Leshin. Rather, Sawtell teaches bipolar transistors having values for beta “on the order of several hundred to above 10,000 for Darlington transistors.” Col. 1, line 67-col. 2, line 14. In addition, Sawtell teaches using such bipolar transistors to amplify a leakage current that is several orders of magnitude less than an LED drive current. Col. 1, line 54-col. 2, line 6. The Office action fails to provide a teaching or suggestion to modify the teachings of Sawtell to include low-beta bipolar transistors, as required by claim 4. For at least this reason, Applicants respectfully maintain that claim 4 distinguishes over Sawtell and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 4 and all claims dependent thereon, be withdrawn.

Regarding claim 29, Applicants respectfully maintain that the Office fails to make a prima facie case of obviousness. See MPEP § 2143. Applicants respectfully maintain that the Office fails to provide a reference that teaches or suggests,

adjusting an effective slope of the reference  
voltage as a function of temperature according to  
a first resistor,

as required by claim 29. Sawtell teaches differential input voltage generation circuit 465 that generates a current  $I_4$  that is temperature independent. Col. 10, lines 47-64. Koazechi teaches a stable reference voltage with respect to changes in temperature. Col. 1, lines 9-17. Nowhere do the references of record teach or suggest adjusting an effective slope of the reference voltage as a function of temperature according to a first resistor, as required by claim 29. For at least this reason, Applicants respectfully maintain that amended claim 29 distinguishes over Sawtell and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 29 be withdrawn.

*Additional Remarks*

Regarding claims 16-18, the Office has failed to provide a basis for rejecting these claims. Applicants respectfully maintain that the art of record fails to teach or suggest the limitations of claims 16-18. Accordingly, Applicants respectfully request that the rejection of claims 16-18 be withdrawn.

Claim 4 is put in independent form.

Claim 10 is amended consistent with amendments to claim 1.

Claim 11 is amended to eliminate redundant language.

Claim 12 is amended consistent with amendments to claim 1.

Claim 30 is amended to correct a grammatical error.

Claim 39 is amended to clarify claim language.

Claim 41 is amended to clarify claim language.

Claim 56 is amended to provide antecedent basis.

Claim 57 is amended to correct a typographical error.

New claim 58 is added further claiming the invention of claim 55.

New claim 59 is added. Claim 59 is believed to be allowable because the art of record fails to teach or suggest a base-collector voltage of the first bipolar transistor equals a voltage difference between two base-emitter voltages biased at different current densities.

New claim 60 is added further claiming the invention of claim 26.

In summary, all claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

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Respectfully submitted,



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